



DECREASING THE CROP LOSSES DURING HARVESTING BY THE COMBINE HARVESTER ON THE FIELD: PRACTICES AND EXPERIENCES IN TURKEY

REFİ RATİP ÖZLÜ

İLKNUR DEDE

AGRICULTURAL ENGINEER- MSc

CHEMICAL ENGINEER- MSc

03 MARCH 2016
COMCEC MEETING

İslam İşbirliği Teşkilatı Ekonomik ve Ticari İşbirliği Daimi Komitesi İSEDAK 7. Tarım Çalışma Grubu Toplantısı için Hazırlanan
Bitkisel Üretim Genel Müdürlüğü Sunumu

INTRODUCTION

- The harvesting and threshing of grain crops with minimal hazards and losses constitute one of the most complicated and stiffy matters of crop production process.
- Numerous approaches, researches and implementations have been put into practice from the old ages to the present in order to provide a good harvesting process of grain crops.

INTRODUCTION



Cereal harvest by scythes in the old past ages

INTRODUCTION



A locally used wooden thresher with blades made flintstones, drawn by animal power(Düven)

INTRODUCTION



Laying of the harvested wheats on a carrier by hayforks and wooden winnowing forks

INTRODUCTION

- One of the most recent expedients targetted to minimize the crop losses during the harvest on the field is to use combine harvesters representing the most improved technology reached as today.
- The harvesting and the threshing of grain crops has been mostly conducted by combine harvesters in Turkey.



CROP HARVESTING SYSTEM AND ITS IMPLEMENTATION IN TURKEY

- As of 2015, there are 15.899 combine harvesters in the harvest machineries park.
- The development of the combine harvesters park in Turkey has been shown in the Table 1 according to the years.

Table 1. Combine harvesters park's development by years

Years	Total Numbers⁽²⁾	Combine Harvester Nr/1000 ha⁽¹⁾
2002	11 539	0.636
2003	11 721	0.667
2004	11 519	0.636
2005	11 811	0.651
2006	12 359	0.709
2007	12 775	0.753
2008	13 084	0.794
2009	13 360	0.824
2010	13.799	0.845
2011	14 313	0.912
2012	14 813	0.958
2013	15 486	0.992
2014	15 899	1.007

•⁽¹⁾ The calculations are based on the areas sown in relevant years(calculated by authors).

•⁽²⁾ TÜİK, 2016

CROP HARVESTING SYSTEM AND ITS IMPLEMENTATION IN TURKEY

- As It can be seen from the table 1, in 2002, the total Nrs. of combine harvesters in the park were 11.539, and The combine harvester Nrs per 1.000 ha was about 0.6.
- Contrary to that, in 2014, the total Nrs. of combine harvesters in the park have increased to 15.899 combines, and the combine harvester Nrs. per 1.000 ha reached to 1 combine.

CROP HARVESTING SYSTEM AND ITS IMPLEMENTATION IN TURKEY

- With the combines as many as that numbers given in the Table 1, 85% of the area sown with grain crops in Turkey has been able to be harvested.
- As for 2015, the area harvested by combine harvesters in Turkey, as an average, accounts of 8.080.168 ha(all grain crops)(*).

CROP HARVESTING SYSTEM AND ITS IMPLEMENTATION IN TURKEY

- The crop harvesting system in Turkey is based on the contracting services for harvesting the crops by combine harvesters.
- With this system, combine harvesters are operated for harvesting the areas higher than 4-5 times of the world averages.
- The main reasons of this are that the harvest season lasts too long, and the number of combine harvesters are low.

CROP HARVESTING SYSTEM AND ITS IMPLEMENTATION IN TURKEY

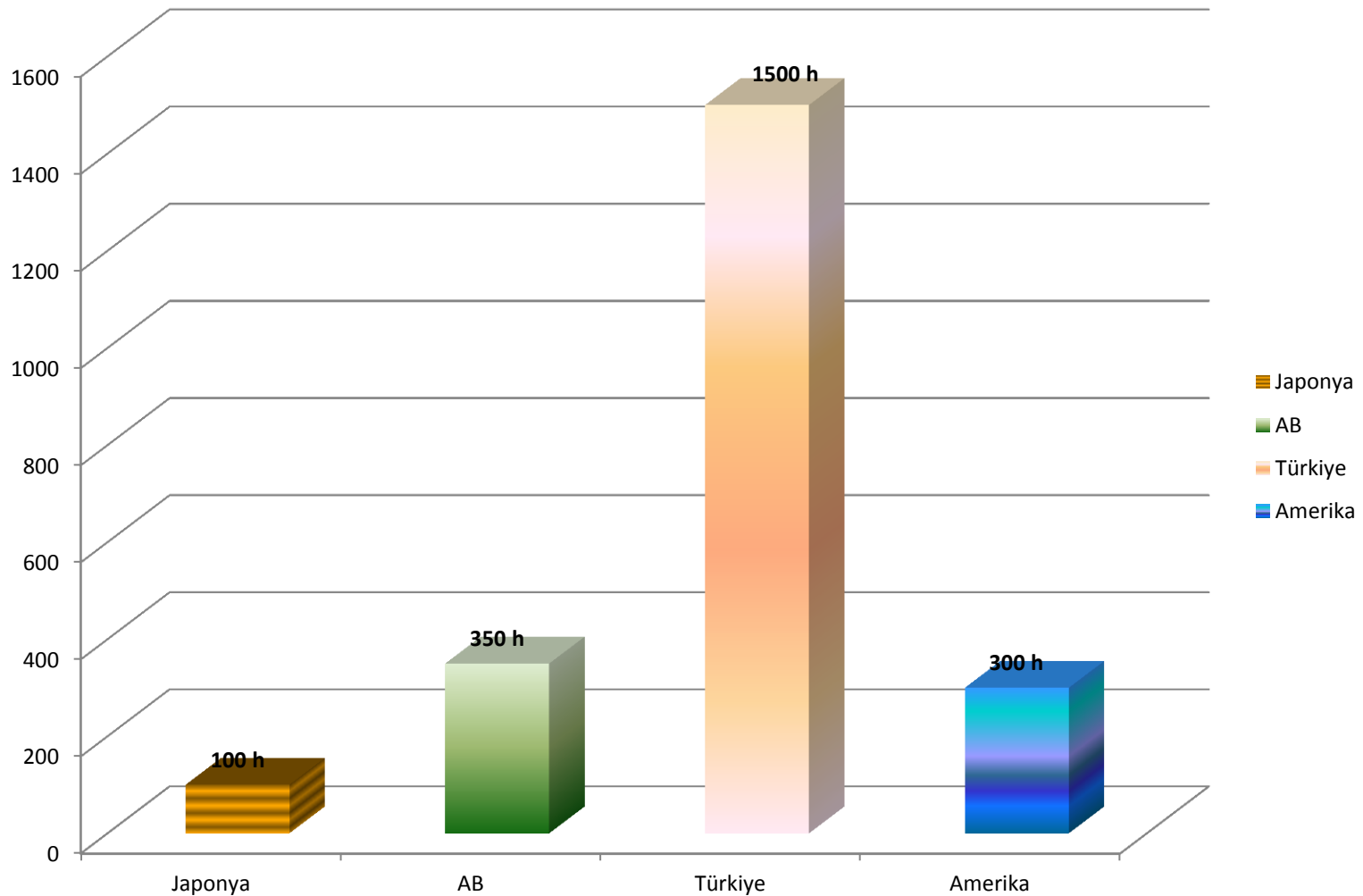
- Due to its assorted climatic zones that Turkey has, the grain crops harvest season starting on May from Çukurova region lasts till the September at Uzunyayla district of Malatya.
- Yet the crop areas accounting for 15-20% of total areas, and not entering under the harvest areas of the combine harvesters, are harvested by reapers and other harvesting equipment like scythes and sickles.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- The harvesting activities realized by combine harvesters have attracted attentions as a fairly heavy farm work in Turkey as are other countries.
- Along the harvesting seasons in Turkey, a combine harvester works about 1.000-1.500 hours as an average on the fields in the harvesting jobs. While annual use of a combine harvesters in the Europe is about 300-350 hours.
- In Scheme 1, the annual operating hours of a combine harvester in different Countries and the EU are given as a chart.

Scheme 1. The annual use of combine harvesters according to the certain geographical regions(Özlu, 2013. Doktora Çalışması Sunumu).

Yearly or seasonally average use of combine harvesters in hours



EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- The operating of combine harvesters via contracts made between farmers and combine harvester owners leads to increases of the annual operating hours of the harvesters which results in decreasing of their mechanical life(*).
- The use of combine harvesters causes averagely about 1.30 to 2.50 % of grain losses which accounts to high economical losses. (See table below)

(*)http://www.ticaretgazetesi.com.tr/haberler_tarimda_yuksek_verim_icin_dogru_mekanizasyon-l-1-sayfa_id-666-id-91843

Table 3. The Losses in the harvests done by combine harvesters(2014)

crops	production (Ton)	price (TL/Ton)	Harvest losses rates(%)	Harvest losses as amount(Ton)	Monetary values(TL)
Wheat	19.000.000	740	1,37	260.300	192.622.000
Barley	6.300.000	620	1,39	87.570	54.293.400
Oat	210.000	730	1,53	3.213	2.345.490
Rye	300.000	600	1,73	5.190	3.114.000
Sunflower	1.637.900	1.860	1,41	23.094	42.954.840
Grain maize	5.950.000	620	1,43	85.085	52.752.700
Soybean	150.000	1.160	2,54	3.810	4.419.600

(Source: TÜİK-BÜGEM)

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- In Turkish conditions, the loss of wheat by combine harvesters account to 1.37 % during harvest season.
- The monetary cost of this loss has amounted to the cash value as 192.622.000* TL(84.855.506 USD).

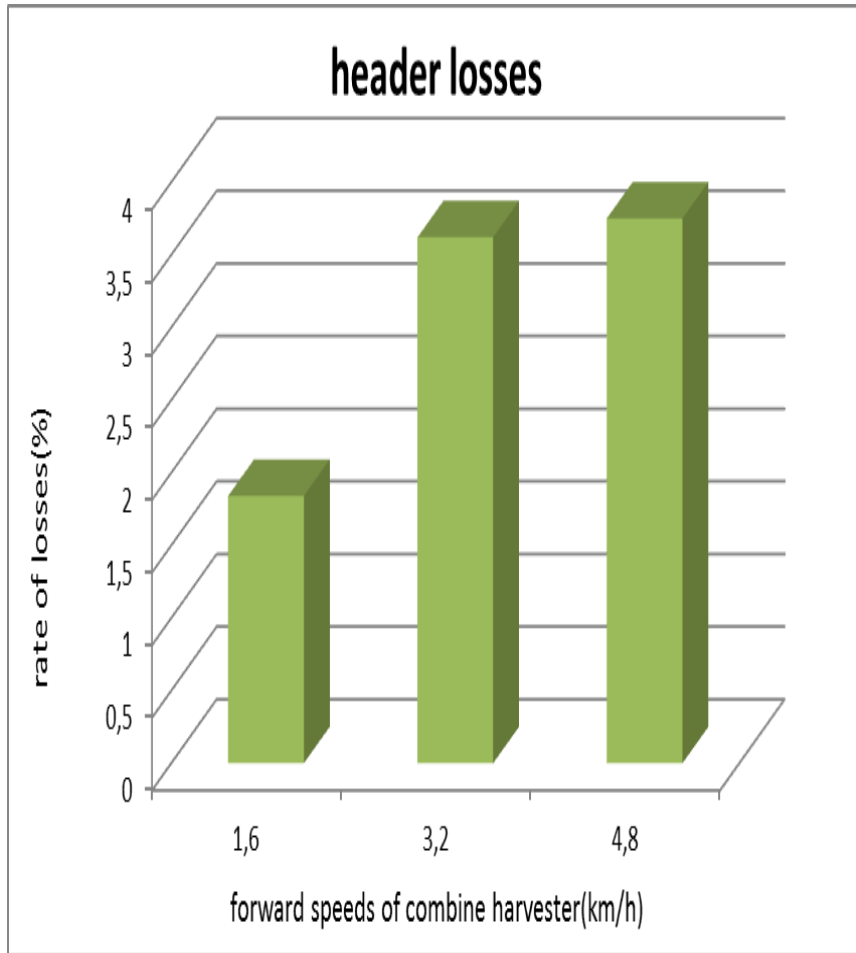
* 2.27 TL/USD

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- Various researches showed that the losses in crop harvesting increase depending on the increase of forward speeds of harvesters.
- In a research conducted on harvest losses(*), the platform losses was 5.37% in the cases where forward speed of combine harvester is 1 km/h and the platform losses was 7.46% while its forward speed was at 2.5km/h.

(*) N. M. Rod et al. Effect of combine working speed and seed moisture content on berseem clover losses in khouzestan. International Journal of Agriculture and Crop Sciences. ISSN 2227-670X ©2013 IJACS Journal

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS



- The results from another research conducted by a Turkish researcher given as graphic chart shows that the header losses were increased dramatically according to the combine harvester forward speeds.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- In the awareness of its importance, as a country, Turkey makes great efforts for minimizing the crop harvest losses during the harvest seasons each year regularly on the harvests carried by combine harvesters.
- The remarkable one among these efforts is the control services of the harvest operations done by using combines.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- The control services of harvests with combine harvesters are planned and programmed each year by the Ministry country wide.
- After the completion of planned controls of harvest operations, the assessment workshops which one of them is as to be before the starting of harvest season and the other one is as to be after the completion of harvest season are arranged in order to assess the harvest operations and their controls.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- Harvest inspectors, combine harvester operators and farmer representatives are invited to this workshop to make their assessments and to put their contributions on the harvest operations.
- Data and findings obtained from those workshops are processed and used in the further harvest planning and programming operations for the coming years.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- When needed, from time to time and randomly, some informal controls are put into practice in order to check out the situations of the control operations for the harvests with combine harvesters carried on the crop fields by the Ministry.
- The latest findings and data observed from the informal inspections practised in 2015 harvest season are briefed in the table represented in the following slide.

Table 4. Findings from the checking survey through informal field harvest inspections in Adana province(2015)

Control nr.	Age of the combine (in years)	Harvested area(da)	Conditions of the fields	Conditions of crops	Yields (kg/da)	Rate of the losses measured (%)	Factors causing to the losses determined
1	7	140	irrigated	strong	600	1	Not exist.
2	1	67	irrigated	strong	660	3	Excessive speed
3	10	80	irrigated	strong	650	13	Excessive speed
4	9	40	irrigated	strong	600	12	Excessive speed
5	4	100	irrigated	strong	---	6	Excessive speed
6	10	41	irrigated	strong	500	2.8	Acceptible.
7	14	40	irrigated	strong	600	1	Not exist.
8	2	72	irrigated	normal	600	17	-dampy harvest, -insufficient fixings of combine, -Excessive reel' rpm, -High forward speed.
9	9	8	-barren -sloped	normal	400	2	Acceptible.
10	1	30	-barren -sloped	normal	500	5	Missing data
11	1	90	irrigated	weak	400	6	Missing data
12	3	100	-barren -sloped - stony	normal	400	1.5	Not exist.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- From those data it is seen that quite highly costs could occur due to the field losses from the harvests with combine harvesters, if it is not properly executed.
- It is experienced excess grain losses when the combine harvesters were operated by the unlicensed and untrained operators.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- Even though the harvest is executed by the licensed and trained operators;
 - Unsuitable and unproper operation of the combine harvesters by the highly ambitious contractors willing high commercial incomes and
 - The attitudes of farmers willing to make their crops harvested urgently
- create severe grain losses.
- On the other hand, the overtime and heavy usages of the combine harvesters can be a factor triggering the grain losses on the field.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- In order to prevent those above mentioned obstacles and to limit the grain losses in the minimal amounts,
- The Ministry of Food Agriculture and Livestock as a competent authority has implemented a comprehensive control programme of harvests on combine harvesters in the Country.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- Pursuant to this programme, in order to define the rules and procedures for the controls and to organize the harvest control services,
- An instruction called as «The Implementing Instruction on Conducting the Control Services for the Combine Harvesters» has been issued and put into practice each year.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- This Instruction has to be implemented by the 81 provincial directorates of the Ministry of Food Agriculture and Livestock.
- Accordingly each provincial directorate prepares its specific «Provincial Combine Harvester Control Program» and fixes «The Reasonable Rates for Grain Losses in the Province» applicable for its provincial borders.

EFFORTS ON THE MINIMIZING THE GRAIN LOSSES IN HARVESTING BY COMBINE HARVESTERS

- The Provincial Directorates arrange specific programmes and extension services on;
 - Raising the awareness of farmers and training of farmers,
 - Training of the combine harvester operators,
 - Training of the harvest controllers,
- The certifications have been issued them following the completion of the courses.

CONCLUSIONS

- In conclusion, in 2015 harvest season,
 - About 3.000 controllers were employed in the harvest control operations.
 - 11.769 combine harvesters and 11.662 combine harvester operators were inspected.
 - 55 combine harvesters not registered officially and 142 operators not satisfying the rates of losses fixed officially were subjected to the legal sanctions.

Thank you all for your attentions

r.ratip.ozlu@tarim.gov.tr

ilknur.dede@tarim.gov.tr